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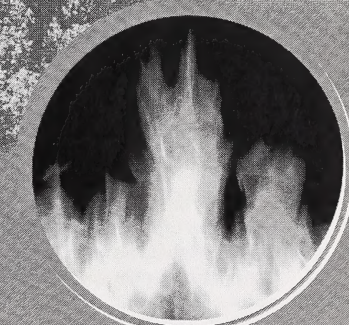
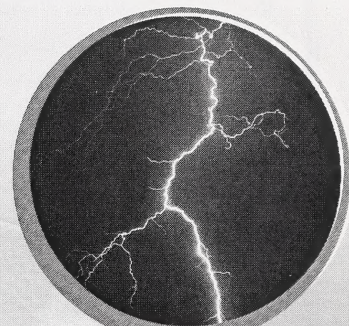
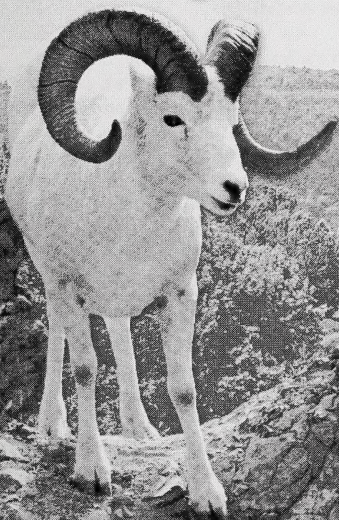
# SCIENCE 9

Module

1

## Biological Diversity

*Home Instructor's Guide  
and Assignment Booklet 1A*



Learning  
Technologies  
Branch

Alberta  
LEARNING



Science 9  
Module 1: Biological Diversity  
Home Instructor's Guide and Assignment Booklet 1A  
Learning Technologies Branch  
ISBN 0-7741-2569-1

Cover Art: middle right: Corbis  
remainder: PhotoDisc Collection/Getty Images

**The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Home Instructor's Guide and Assignment Booklet.**

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	



You may find the following Internet sites useful:

- Alberta Learning, <http://www.learning.gov.ab.ca>
- Learning Technologies Branch, <http://www.learning.gov.ab.ca/ltb>
- Learning Resources Centre, <http://www.lrc.learning.gov.ab.ca>

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

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# Introduction to Science 9

Welcome to Science 9! We hope that you and your student enjoy working through this course together.

## The Course at a Glance

There are five modules for this course.

### Module 1

Biological Diversity

**Section 1:**  
Diversity in the  
Ecosystem

**Section 2:**  
Handing Down Species'  
Characteristics

**Section 3:**  
The Impact of Human  
Activities

### Module 2

Matter and Chemical  
Change

**Section 1:**  
The Building Blocks  
of Matter

**Section 2:**  
The Chemical Nature  
of Matter

**Section 3:**  
Characteristics of  
Chemical Reactions

### Module 3

Environmental  
Chemistry

**Section 1:**  
Environmental  
Quality

**Section 2:**  
The Problem of  
Pollution

### Module 4

Electrical Principles  
and Technologies

**Section 1:**  
The Basics of  
Electricity

**Section 2:**  
Energy Conversions

**Section 3:**  
Electricity Production,  
Distribution, and Use

### Module 5

Space Exploration

**Section 1:**  
Earth Among  
Celestial Objects

**Section 2:**  
Advanced  
Technologies

**Section 3:**  
Satellites and  
Spacecraft



# Science 9 Curriculum Information

Alberta Learning, a department within the Government of Alberta, is responsible for determining what Alberta students are expected to learn from Kindergarten to Grade 12. The department works with its stakeholders to design curriculum and provide authorized resources that meet the needs of learners and educators.

This distance learning course was designed and developed by Learning Technologies Branch within Alberta Learning. The course components have been reviewed and approved as provincially authorized resources. This means the Alberta teachers and publishing staff who made these resources have ensured they comply with the standards and specifications established by Alberta Learning for this curriculum.

Specific information about this curriculum can be found on the Alberta Learning website where Curriculum Handbooks for Parents and Curriculum Summaries are available:

<http://www.learning.gov.ab.ca/parents/handbooks/>

Following is a brief summary of the program at this grade level.

## Overview of the Program of Studies

The science program promotes scientific literacy. “What is scientific literacy?” you may ask. Well, scientific literacy is having knowledge and competence in science. To help students gain literacy in science, the science program is designed to

- encourage students at all grade levels to develop a critical sense of wonder and curiosity
- enable students to use science and technology to improve the quality of their own lives and the lives of others
- prepare students to critically address science-related issues
- provide students with a foundation in science needed for higher levels of study, for science-related occupations, and for science-related hobbies
- enable students to develop a knowledge of the wide spectrum of careers related to science, technology, and the environment

The science program presents science in contexts to which students can relate. Using meaningful contexts provides opportunities for students to explore the process of science, its applications and implications, and to examine related technological problems and issues. By doing so, students become aware of the role of science in responding to social and cultural change and in meeting needs for a sustainable environment, economy, and society.

The science program holds the view that

- communication skills are essential
- teamwork skills are important

The junior high science program is made up of modules—five at each grade level. Each grade level includes modules from life science, physical science, and earth/space science.



The program identifies one of the following emphases and skill sets for each module:

***Nature of Science Emphasis.*** This is a focus on the processes by which scientific knowledge is developed and tested and on the nature of the scientific knowledge itself. The associated skills are the skills of scientific inquiry.

***Science and Technology Emphasis.*** This is a focus on solutions to practical problems by developing and testing prototypes, products, and techniques to meet a given need. The associated skills are those of problem solving, in combination with scientific inquiry.

***Social and Environmental Emphasis.*** This is a focus on issues and decisions that relate to how science and technology are applied. The associated skills are the using of research and inquiry skills to inform the decision-making process, seeking and analyzing information, and considering a variety of perspectives.

For more information about the science program see the Science Program of Studies document. Go to Alberta Learning's Curriculum page at

**[http://www.learning.gov.ab.ca/k\\_12/curriculum/bySubject/](http://www.learning.gov.ab.ca/k_12/curriculum/bySubject/)**

Click on "Science" and then on the appropriate course name.



# Overview of Science 9

Science 9 consists of five modules.

Module	Emphasis	Key Concepts of Subject Matter
1. Biological Diversity	Social and Environmental	asexual and sexual reproduction; biological diversity; cell division—includes binary fission and formation of sex cells; chromosomes, genes, and DNA (introductory treatment); diversity within species; habitat diversity; inheritance; natural and artificial selection of genetic characteristics; niches; populations; species
2. Matter and Chemical Change	Nature of Science	chemical nomenclature (introductory treatment); conservation of mass; elements, compounds, and atomic theory; endothermic and exothermic reactions; factors affecting reaction rates; periodic table; reactants and products; substances and properties; WHMIS and safety
3. Environmental Chemistry	Social and Environmental	concentration and dispersal; acids and bases; air and water quality; chemicals essential to life; evidence of toxicity; hazards, probabilities, and risk assessment; ingestion and absorption of materials; organic and inorganic material; stability and biodegradability; substrates and nutrients; uncertainties in environmental monitoring and in assessing toxicity and risk
4. Electrical Principles and Technologies	Science and Technology	circuits; electric charge and current; electrical energy storage; electrical resistance and Ohm's law; energy transformation; energy transmission; forms of energy; generation of electrical energy; measures and units of electrical energy; renewable and nonrenewable energy
5. Space Exploration	Science and Technology	communication technologies; composition and characteristics of bodies in space; distribution of matter through space; life-support technologies; reference frames for describing position and motion in space; satellites and orbits; technologies for space exploration and observation



# Science 9 Course Components

## Structure of the Learning Package

### Basic Design

This learning package includes

- five Student Module Booklets
- Home Instructor's Guides and Assignment Booklets—two for each module

A survey of the learning package components will show you that the course is divided into clumps of learning called modules. These modules correspond to basic elements of the science program.

For each module there are two print components: a Student Module Booklet and a combined set of Home Instructor's Guides and Assignment Booklets. Remove the Assignment Booklets from the Home Instructor's Guides when the student starts each module.

The document you are presently reading is the Home Instructor's Guide.

### Student Module Booklets

Contents
Resources Before You Begin Icons Module Overview Assessment Planning Ahead
Section 1 Lesson 1 Lesson 2 Lesson 3
Section 2 Lesson 1 Lesson 2
Section 3 Lesson 1 Lesson 2
Module Summary Module Review
Appendix

Student Module Booklets contain guided lessons that instruct students in a relevant, realistic setting. These booklets have been specially designed to promote such qualities in the learner as autonomy, independence, and flexibility. Writers have incorporated such teaching strategies as working from the concrete to the abstract, linking the old to the new, getting students actively involved, and using advance, intermediate, and post organizers. Many other techniques are used to cater to individual learning styles and preferences. The materials have been designed to include a variety of pathways and options because they are intended for a broad range of use within and beyond Alberta.

The structure of the Student Module Booklets follows a systematic design. At the beginning of each booklet is a table of contents that shows the students all of the main parts; the table acts as an organizer for students. The Module Overview introduces the module content and includes a graphic representation to help visual learners and poor readers. The overview includes an assessment statement, where students are informed of the weightings of each assignment. The overview also includes a page called "Planning Ahead." This page lists materials and equipment needed for each section. This page also gives tips on how the student can prepare for the module ahead of time.

The body of the Student Module Booklet is made up of two or three sections. Each section consists of related lessons that develop concepts, skills, and attitudes of the module. The lessons may include print, library, computer, or Internet involvement. Each Student Module Booklet also includes "Going Further" items as optional enrichment opportunities. At times, more than one pathway is provided to allow a choice based on materials and equipment availability. This flexibility caters to each student's personal situation.

Following the last section is a modular summary that focuses on the skills and strategies that the student has learned. The Student Module Booklet ends with an Appendix that includes a Glossary and Suggested Answers for selected self-assessment questions posed in the module. Answers for the other questions posed in the module are provided in the Home Instructor's Guide.



# Home Instructor's Guides and Assignment Booklets

Accompanying each Student Module Booklet is a set of Home Instructor's Guides and Assignment Booklets.

Each Home Instructor's Guide contains answers to questions posed in the Student Module Booklet that are to be checked with the help of the home instructor or teacher. Having the answers in the Home Instructor's Guide allows the home instructor or teacher to play an important role of monitoring the students' work, and to assist in pacing.

At various points in the Student Module Booklets, the student is directed to do questions in the Assignment Booklets. The student should not attempt to work through the Assignment Booklets independently of the associated Student Module Booklets. The questions in the Assignment Booklets can be used for both formative and summative assessments. The Assignment Booklets have been designed for both in-classroom use and for distance learning.

## Multimedia CDs

Your course contains two CDs. These CDs contain various multimedia segments that will help your student learn the basic concepts within this course. Students learn in different ways, and technology helps create different kinds of learning environments. Students have an opportunity to interact with the information. They can try different scenarios and see what happens. They can see how these concepts relate to world problems and situations.

These multimedia segments will help your student understand, use, and apply technology in effective, efficient, and ethical ways. Learning information and communication technology (ICT) skills is necessary for your student to ensure ongoing competitiveness in a knowledge economy.

If you do not have access to a computer, make every effort to arrange for your student to have periodic access to a computer in a nearby school or library.

## Additional Resources

### Textbook



*ScienceFocus 9*, published by McGraw-Hill Ryerson Limited, 2002



## Materials and Apparatus

A list of materials and apparatus needed to complete each module is given on the Planning Ahead page of each Student Module Booklet. These materials and apparatus are also listed in the information specific to each module given later in this document. For an appreciation of the context in which the materials and apparatus are to be used, scan the activities and investigations in the lessons of the Student Module Booklets and on the referenced pages in the textbook. Any materials or apparatus needed for the optional “Going Further” items throughout the Student Module Booklets are not included in these lists.

If the student doesn't have access to a school lab, you will need to supply the student with the following loan kit.

- eight, 15 cm wires with stripped ends
- two, 2.5 V bulbs and two bulb holders
- three, 3.7 V bulbs and three bulb holders
- a 5 m insulated 26 gauge copper wire
- 60 cm of enamel coated magnet wire
- 12 alligator clips
- a bar magnet
- one double D-battery (cell) holder
- three D-batteries (cells)
- an eye dropper
- a knife switch
- two large paper clips
- one pair of latex gloves
- a magnifying glass
- a multimeter
- a pair of safety goggles
- 12 universal indicator papers and a scale

Some of the listed materials and apparatus may be on loan from your local school. Check with the teacher.

## Internet Links

The Internet can be a valuable research and learning tool for your student. Periodically, references to Internet sites are provided in the Student Module Booklets and/or in the Home Instructor's Guide. Note that going to the websites referenced in the courseware is optional, as Internet use is not a course requirement. You should also encourage your student to use other information sources, such as the library.

If your student is using the Internet, there are a few things to keep in mind:

- **Do not believe everything you read.** The Internet is filled with information. Unfortunately, not all of it is correct. Anyone can put information on the Internet. The important thing is that your student takes a close look at the source to determine who is credited with supplying the information. For example, did a university, a museum, or a science centre put the information on the Internet? If so, it probably provides correct information.

The point is to encourage your student to use a critical eye and not to believe everything he or she reads. If your student is uncertain about something, it is wise to double check the information on one or two other sites or with other resources.

Go to the Internet sites referenced in the Student Module Booklets or this guide before your student accesses them. Confirm the site is still relevant and appropriate for your student. The owners of the Internet addresses (URLs) sometimes change, and a site that was educational when this course was written may no longer be suitable. Also, try out recommended search words to confirm that they are still safe.



- **Use online research tools.** There are a number of different tools, called search engines, available to assist your student in finding information on the Internet. These engines organize and sort information by topic or key word. AltaVista Canada ([www.altavista.com](http://www.altavista.com)), Google Canada ([www.google.ca](http://www.google.ca)), and Yahoo! Canada ([www.yahoo.ca](http://www.yahoo.ca)) are just a few of the search engines available.
- **Websites can change or disappear.** Your student should keep in mind that the Internet is constantly changing. Sometimes he or she will discover that after typing in an address, a note will come up on the screen indicating that the site has moved or disappeared. If your student finds that an address does not work, he or she should go back to one of the search engines and do a general search using a key word or phrase.

In Science 9 the student must communicate scientific results. Graphing scientific data is an important part of communication. For help with graphing you may direct the student to the following source from Statistics Canada:

<http://www.statcan.ca/english/edu/power/ch9/first9.htm>

## LearnAlberta.ca

LearnAlberta.ca is a special, protected website found at <http://www.learnalberta.ca>. It has been developed by Alberta Learning for Albertans. Whenever your student is asked to go to this large site (portal), you can be assured the contents have been either developed by or for Alberta Learning or licensed to Alberta Learning because it is quality content related to Alberta students' needs.

LearnAlberta.ca is a recognized, digital learning environment for Albertans. This Alberta Learning portal is a place where students can support their learning by accessing resources for projects, homework, help, review, or study. Home Instructors also have access so they can learn what their students are expected to know and be able to do. They can then support their students' learning.

For example, LearnAlberta.ca contains a large Online Reference Centre that includes multimedia encyclopedias, journals, newspapers, transcripts, images, maps, and more. The National Geographic site contains many current video clips that have been indexed for Alberta Programs of Study. Teacher support materials and student activities are also available. The content is organized by grade level, subject, and curriculum objective. Use the search engine to find key concepts quickly. Check this site often as new interactive multimedia segments are being added all the time.

If you find a password is required, contact your teacher or school to get one. No fee is required.



# The Role of the Home Instructor

As the home instructor, you have a key role in determining your student's success in this course. Your student needs encouragement and the confidence of knowing that the course is important to his or her future.

You are expected to perform the following duties:

- Ensure your student has a suitable study area.
- Ensure your student establishes a timetable.
- Supervise your student's completion of the Science 9 modules.
- Monitor your student's progress.
- Provide your student with encouragement.
- Check your student's work, or supervise your student's checking of the lessons.
- Supervise the submission of Assignment Booklets.
- Develop a routine and a good working relationship with your student. Remember, education is a partnership.

Here are a few other things you can do to help your student maximize his or her chances of success in this course:

- Encourage your student to read the modules and selections in the textbook carefully and completely. Students should answer all questions in their notebooks. In some cases, it may be appropriate for your student to discuss the questions with you. Students should check their responses with the suggested answers after they have attempted to answer the questions. Encourage your student to discuss his or her answers with you after the student has compared his or her responses with the suggested answers.
- Since developing speaking and listening skills is important, students must be provided with opportunities to work with others. As much as possible, encourage your student to discuss the material, ideas, and assignments in the course with you or with others.
- Encourage your student to read as much as possible.
- Ensure that your student works through each Assignment Booklet slowly and carefully. Most assignments include assessment criteria so that students can see how the assignment will be marked. Review the assessment criteria with your student before he or she begins each assignment. Encourage your student to revise and edit his or her work; assignments should reflect students' best efforts. As you guide and advise your student, be sure that you do not direct or take control of the work being done. Students must assume responsibility for their work and learn from their mistakes as well as their achievements.
- Review your student's assignments when they have been marked and returned by the teacher. Help the student to understand his or her areas of relative strength and weakness and to see where improvements are needed. Try to praise your student's efforts and successes, and give encouragement when he or she is facing challenges.



# Arranging the Learning Area

One of the best ways to ensure success for your student is to establish a study corner. This area should be well lit, quiet, and free from interruptions and distractions. A comfortable, ergonomic chair and sufficient workspace on a table or desk are essential. Students require sufficient space for course materials, books, and equipment.

## Time Commitment

It is important that the student has a schedule. Ensure that the student does some advance planning. Check the final plans to see that they are realistic.

Only you and your student know how much time is available for completing a course. It doesn't matter too much what time of day the student does the course work—this varies with the individual's situation. You and your student must decide when you wish to have the course completed. When you make this estimate, you must take into account time worked away from home, time needed for chores, and time needed for recreation and relaxation.

Modify your plans as circumstances change. Be flexible, but don't procrastinate. A planned approach to module completion will help your student successfully complete the course. For a first approximation of when modules should be completed, divide the number of weeks available by the number of modules. Adjust the number of weeks per module to allow for a review. Use a calendar to establish the completion dates for each module. If your student has trouble keeping to a schedule, place the scheduled completion dates on the family calendar.

## Breaks

Study breaks serve important functions. Scheduled study breaks prevent mental fatigue. Taking timely study breaks improves the retention of information. Making time for study breaks within a study session makes the session seem less daunting.

For a study break to be effective, the student should take them outside of the study area. Your student should consider a break of 10 to 15 minutes—that's enough time to feel refreshed but not so long that one loses motivation to return to the task. A drink of water, a snack, or some form of exercise is suitable for a break. It should be something enjoyable.

Students do vary in their need for study breaks. For example, physically active students may need more breaks than others. Students who are very focused may need fewer breaks. Once your student starts using breaks to make studying more effective, study breaks can be adjusted for optimum length and frequency based on personal needs.

## Assessment

Assessment is important to the development of every learner. There are two kinds of assessment in this course: informal and formal. As the home instructor, you will take part in the informal assessment.



## Informal Assessment

The suggested answers in the Appendix give students immediate feedback, which confirms and clarifies their understanding before they go on. At the junior high level, monitoring student responses and discussing the results with students is one of the most important duties of the home instructor. When your student has completed a lesson, you should skim over it to be sure he or she has spent enough time and effort on the lesson.

When checking your student's work, first focus on the work he or she has done correctly and then comment on his or her efforts. Then, if necessary, spend time clearing up any misunderstandings. Following are a few suggestions that have proved to be constructive ways of handling errors. First, stop to consider why there are errors. Ask yourself the following questions:

- Is the student repeatedly making the same errors or do the errors appear to be random?
- Do the errors appear to be the result of carelessness?

If your student is repeatedly making the same mistakes, you may need to read through that section and explain in your own words what the main ideas are. If the errors are random and do not have a serious impact, then they may be ignored. If the errors appear to be due to carelessness, you may need to

- check to see if your student understands the directions
- relate the activity where the error occurred to some meaningful aspect of your student's life
- discuss the information with your student
- have your student slow down
- give your student a rest

Always instruct your student to correct incorrect responses. The Student Module Booklet becomes an important reference when doing assignments, and it is essential that it is accurate. Remember, it is very important that students not only learn from their corrections, but that they also realize that making mistakes is a normal part of learning.

## Formal Assessment

Formal assessment is based on the work students do in their Assignment Booklets and on a final test, both of which are marked by a teacher.

There are two Assignment Booklets for each module in the course. The assignments are based on the work the student has completed in the module. Your student may refer to the Student Module Booklet while completing the assignments. Each module assignment submitted for assessment is judged on the basis of the student's demonstrated understanding of the concepts taught in that module, completeness of work, neatness, and legibility.

Science 9, being a core subject in junior high, requires the writing of a final test that must be supervised by a responsible adult. Contact your learning provider for information about the administration of the final test.

The final mark is determined by how well the student does on all the modules and the final test. It is suggested that the test make up 20% of the student's mark with the other 80% based on course work, as assessed by the teacher.



# Special Features

The lessons within the Student Module Booklets contain items labelled “Going Further.” These items are for students who want to do extra, in-depth work. They provide many interesting topics to work on. Allowing students a choice in selecting these items gives them ownership in their learning.

For example, a series of “Going Further” items in Module 1 deals with the effects of fire in an ecosystem. There’s also a “Going Further” about species at risk in Canada. Another one is about living things on the Galápagos Islands.

The “Did You Know?” items include some interesting science-related facts. For example, one “Did You Know?” tells about meerkats. These creatures are extremely sociable. They take turns serving sentry duty for others who have their heads down while having something tasty to eat.

## Textbook



The textbook *ScienceFocus 9* complements the Student Module Booklets. The textbook has special features, which are described in “A Tour of Your Textbook” on page xviii.

The importance of safety is indicated in “Safety in Your Science Classroom” on pages xxvi to xxix. Many of the safety rules apply to investigations done in the home, which are outside teacher-supervised science laboratories.

Noteworthy are features throughout the textbook labelled “Pause and Reflect.” See pages 7 and 15 of the textbook for examples of these. These features provide opportunities for the student to make connections to related ideas the student may be familiar with. By relating new ideas to those students are familiar with, students construct their own meaning. This process of making connections is important—it fosters genuine learning.

The “Pause and Reflect” features direct students to their Science Log. Keeping a Science Log helps students keep track of day-to-day progress. Some students may have to be encouraged to make regular entries. The entries should include the day and date for the entry. The Science Log entries may be kept in a separate booklet or in the Notebook for Science 9.

## Notebook for Science 9

The student does have to keep a separate notebook for Science 9. Space for written responses are not provided in the Student Module Booklets themselves. The student may use a three-ring loose-leaf binder for a notebook.

The notebook should be used to make and keep study notes and answers to exercises. It should also be used to record results while doing science investigations. In addition, the notebook may be used for Science Log entries if the student chooses not to use a separate exercise book for these entries.

# Icons

There are a number of visual cues or icons that are used in the Student Module Booklets. These are described at the beginning of each module. The following are icons that may signal a supporting role for you.



This icon indicates some preparation must be made ahead of time. Some students may need to be reminded to attend to these preparations.



This icon indicates that either you or the teacher should be contacted. You may need to provide help, approve a procedure, or check an answer.



Safety icons warn of potential hazards. Some students may need to be supervised very closely to ensure they avoid hazardous practices.



The Internet icon indicates a reference to an on-line resource. If your home does not have the Internet, you may have to provide transportation to the local school or library for the students to access the Internet.

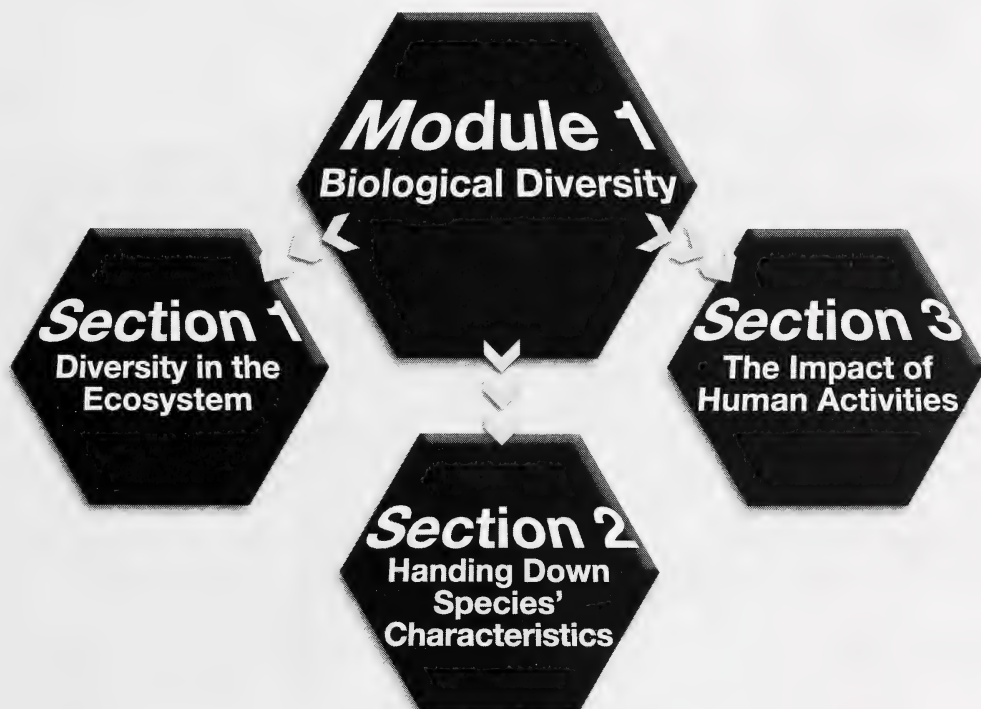


# Module 1: Biological Diversity

The major emphasis of this module is Social and Environmental.

The range of species found around the world represents biological diversity. So do the small variations within individual species. In this module the student explores natural processes that have led to the biological diversity of today. But human activity can lead to species dying out and to a loss of biological diversity. The student considers issues concerning environmental quality and the impact of technologies.

This module builds on ideas introduced in Science 7, Module 1: Interactions and Ecosystems, and introduces ideas that will be developed further in Science 20, Module 2: Changes in Living Systems.



# Assessment

The student's successful completion of all assignments in the Assignment Booklets will depend on practice obtained while doing the various activities and readings. Choices of activities have been provided so that students have some control over their own learning.

The following distribution of marks is suggested in determining the student's grade for this module.

<b>Assignment Booklet 1A</b>		
Section 1 Assignment		18 marks
Section 2 Assignment		43 marks
<b>Assignment Booklet 1B</b>		
Section 3 Assignment		26 marks
Final Module Assignment		<u>35 marks</u>
<b>TOTAL</b>		122 marks

## Section 1: Diversity in the Ecosystem

In this section the student gains a basic understanding of biological diversity and how it helps species to survive. The student observes variation among and within species. The student identifies niches and the role of variation in allowing closely related living things to survive in the same ecosystem. Variation also plays a role in the survival of species when environmental conditions change. The student investigates the dependencies among species. These dependencies link the survival of one species to the survival of others.

The following materials will be needed to complete this section.

### Section 1: Lesson 1

- a tape measure

### Section 1: Lesson 2

No extra materials are needed for this lesson.

### Section 1: Lesson 3

No extra materials are needed for this lesson.



## Suggested Answers

### Section 1: Lesson 3

Textbook questions 1, 4, and 6 from “Wrap-up: Topics 1 to 2,” page 25:

1. The items match as follows.

A	B
a struggle for resources between organisms of the same or different species	competition
a species with a very narrow niche	specialist
the word that describes both the role and the habitat of an organism	niche
the many differences between individuals of the same or different species	variation
a mathematical expression of the different kinds of organisms in an area	diversity index
a direct or close association between two different species	symbiotic
the habits of a species that have been developed over time	behavioural adaptations
populations of these organisms tend to be high, although there is not usually very much diversity in the kinds of these organisms	generalists

4. Wide ranges of tolerance for food, shelter, and other items give generalists the flexibility to survive changing environmental conditions. However, two species having a broad niche cannot co-exist well in the same region. Therefore, the biodiversity of such species is lower.

6. Most species of plants, animals, and micro-organisms are dependent on other organisms. Removing species from an area will affect associated species. The more species you remove, the greater the effect. Generalists would have a greater chance of surviving environmental change than would specialists—a wider range of tolerances make generalists more flexible.

### Section 2: Handing Down Species' Characteristics

In this section the student will focus on the way characteristics are handed down during sexual and asexual reproduction. The student will see how these modes of reproduction contribute to biological diversity. The student will observe and identify characteristics that are inherited. The student will be introduced to the role of DNA, genes, and chromosomes in carrying characteristics from parents to offspring.

The following materials will be needed to complete this section.

## Section 2: Lesson 1

- bread (perhaps several different types)
- several plastic bags—sealable or with ties
- a magnifying glass

## Section 2: Lesson 2

No extra materials are needed for this lesson.

## Section 2: Lesson 3

No extra materials are needed for this lesson.

## Section 2: Lesson 4

No extra materials are needed for this lesson.

## Suggested Answers

### Section 2: Lesson 1

8. The manipulated variable could be any of the following: light intensity, moisture, temperature, or the type of bread.

The responding variable would be one of the following: the amount of surface area covered by mould; the number of types of moulds growing; the mass of the mould; or the length of time required for mould to appear.

The controlled variables cannot include the manipulated variable or the responding variable. Depending on the investigation, the controlled variables could be light intensity, moisture, temperature, the type of bread, and the mass of bread.

9. Answers may vary.

The question could fit this pattern: How does an increase in the (manipulated variable) affect the (responding variable)?

Suppose the student picked temperature as the manipulated variable and the amount of surface area covered by mould as the responding variable. Then an appropriate question would be as follows: How does an increase in temperature affect the amount of surface area covered by mould?

10. Answers will vary depending on the experimental design. Here is one example of a hypothesis:

If you *increase*  
the *temperature for growth (up to a point)*,  
then the *surface area covered by mould on bread*  
will *increase*  
because *heat is necessary for life. The mould will be able to carry out its life processes better in a warmer environment.*



11. The steps of the procedure are as follows:

**Step 1:** Place six slices of fresh, moist, preservative-free bread in separate clean plastic bags. These serve as “growth bags.” The growth bags should be clear and not have been used previously. Move each slice from the original bread bag directly into its growth bag without laying the bread down. Be sure the slices are the same size and that none of them are crusts. Seal each growth bag tightly.

**Step 2:** Write the letter *C* (for cool) on two small pieces of invisible tape, *W* (for warm) on two others, and *H* (for hot) on two more pieces of invisible tape. Place one label on each growth bag.

**Step 3:** Label six paper lunch bags in the same way.

**Step 4:** Place each bagged slice of bread in a paper lunch bag with its corresponding label. Fold the bag closed.

**Step 5:** Lay the two growth bags marked *C* flat in the fridge side-by-side where they will not be disturbed. Those growth bags marked *W* can be laid flat, side-by-side in a cupboard or on a table where they will remain at room temperature and not be disturbed. Those growth bags marked *H* can be laid flat, side-by-side on, or close to, a furnace vent or a hot-water heating source where they will be regularly subjected to higher temperatures and not disturbed.

**Step 6:** One week later, examine both sides of each slice of bread. Make observations with and without a magnifying glass. Write brief descriptions and sketches of your observations in your data table. Estimate and record the percentage of the surface of the bread (front and back together) that is covered by mould.

12. Answers will vary. The student may present the following chart to show how the observations will be recorded. The student should plan ahead. The cells must be large enough to hold a sketch or a description.

Getting Mouldy		
Temperature	Percentage of Bread Covered by Mould (%)	
	Slice 1	Slice 2
cold		
warm		
hot		

13. Answers will vary. Most moulds grow well in a warm, dark, moist environment. Some do not “mind” the light so the student may observe different moulds growing under different conditions on the same or different slices of bread. With the magnifying glass, the student should be able to see the sporangia and hypha.

**Sample Conclusion:** As the temperature for growth increased to a point, the amount of mould on the bread increased. Mould grew much better at room temperature than it did in the colder fridge. No mould grew on the “hot” slices. My observations agreed with the prediction of my hypothesis. However, mould did not grow at the high temperature. High heat may kill or damage the fungus. The investigation supports this explanation: Life processes proceed better in a warmer environment.

**Note:** It would be revealing to redo the investigation with samples growing at several more temperatures within the range already investigated. A more continuous range of temperatures would provide a more complete and accurate picture. That way an optimum growth temperature could be discovered.

High and low temperature extremes slow or prevent growth and reproduction.

Students may see both hypha and sporangia. That would indicate the mould was reproducing both sexually and asexually.

## Section 2: Lesson 4

**Textbook questions 1, 4, 5, 6, 8, and 10 from “Wrap-up: Topics 3 to 5,” page 57:**

1. (a) Both produce sex cells. The pistil produces eggs, and the stamen produces sperm or pollen.  
(b) Both reproduce sexually. Angiosperms encase the eggs in an ovary, while gymnosperms produce exposed eggs on the edges of modified leaves—cones.  
(c) Both are reproductive structures that will grow into new organisms. Seeds are always produced sexually. Spores can be produced either sexually or asexually.
4. A heritable trait is a characteristic that can be passed down from parent to offspring in the genetic material.
5. DNA is the answer.
6. The term is genetically engineered, genetically modified, or transgenic.
8. A zygote is produced. It then undergoes many cell divisions to become a new individual.
10. Mutants capable of surviving and reproducing add variation to a species.



# ASSIGNMENT BOOKLET 1A

Science 9

Module 1: Section 1 Assignment and Section 2 Assignment

Home Instructor's and Student's Comments:

**STUDENT FILE NUMBER**  
(if label is missing or incorrect)

\_\_\_\_\_

Date Submitted:

\_\_\_\_\_

Apply Module Label Here

Name

Address

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*Please verify that preprinted label is for  
correct course and module.*

**FOR SCHOOL USE ONLY**

Assigned Teacher:

\_\_\_\_\_

Date Assignment Received:

\_\_\_\_\_

Grading:

\_\_\_\_\_

Teacher's Comments

\_\_\_\_\_  
Teacher's Signature

Home Instructor: Keep this sheet when it is returned to you as a record of the student's progress.

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When you are registered for distance learning courses, you are expected to regularly submit completed assignments for correction. Try to submit each Assignment Booklet as soon as you complete it. Do not submit more than one Assignment Booklet in one subject at the same time. Before submitting your Assignment Booklet, please check the following:

- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

## MAILING

1. Do **not** enclose letters with your Assignment Booklets. **Send all letters in a separate envelope.**
2. Put your Assignment Booklet in an envelope and take it to the post office and have it weighed. Attach **sufficient postage** and seal the envelope.

## FAXING

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2. All faxing costs are the responsibility of the sender.

## E-MAILING

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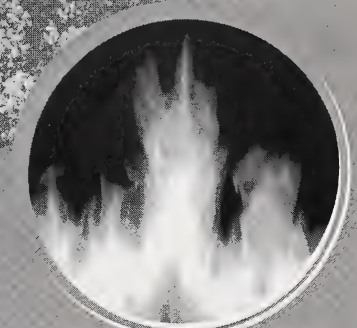
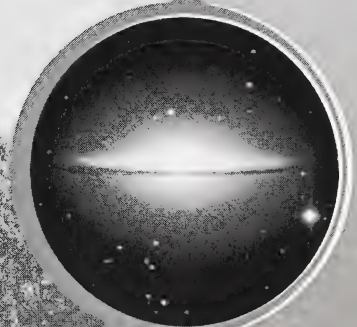


# SCIENCE 9

Module

1

## Biological Diversity *Assignment Booklet 1A*



Learning  
Technologies  
Branch

Alberta  
LEARNING

## FOR TEACHER'S USE ONLY

### Summary

### Teacher's Comments

	Total Possible Marks	Your Mark
Section 1 Assignment	18	
Section 2 Assignment	43	
	61	

Science 9  
Module 1: Biological Diversity  
Assignment Booklet 1A  
Section 1 Assignment and Section 2 Assignment  
Learning Technologies Branch

**The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Assignment Booklet.**

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This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	



You may find the following Internet sites useful:

- Alberta Learning, <http://www.learning.gov.ab.ca>
- Learning Technologies Branch, <http://www.learning.gov.ab.ca/ltb>
- Learning Resources Centre, <http://www.lrc.learning.gov.ab.ca>

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

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**ASSIGNMENT BOOKLET 1A**  
**SCIENCE 9: MODULE 1**  
**SECTION 1 ASSIGNMENT AND SECTION 2 ASSIGNMENT**

Your mark for this module will be determined by how well you do your assignments.

This Assignment Booklet is worth 61 marks out of the total 122 marks for the assignments in Module 1. The value of each assignment and each question is stated in the left margin.

Work slowly and carefully. If you have difficulty, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

18

**Section 1 Assignment: Diversity in the Ecosystem**

**Read all parts of your assignment carefully and record your answers in the appropriate places.**

1. Examine the picture of the eagle on page 25 of the textbook.

2

a. List two structural adaptations of an eagle.

---

---

1

b. Give one behavioural adaptation of an eagle.

---

2

2. Provide two reasons why many tropical ecosystems have high biodiversity.

---

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---

---

2

3. Variation is greater \_\_\_\_\_ species than it is  
\_\_\_\_\_ species.

Return to page 20 of the Student Module Booklet and continue with Lesson 2.

Circle the letter of the best response for questions 4 and 5.

①

4. One niche can be described in this way.

It breaks down the organic matter and dead things in the soil. In breaking down, organic matter releases nutrients for other organisms.

Which of the following organisms fills this niche?

- A. algae
- B. dragonflies
- C. fungi
- D. hawks

①

5. Which of the following is a specialist?

- A. an Arctic hare
- B. a lion-tailed macaque
- C. a polar bear
- D. a wolf

6. Parasitism, mutualism, and commensalism are types of symbiotic relationships. What type of symbiotic relationship exists in the following situations?

①

- a. Epiphytes are small plants that grow high up on the branches of trees in the rain forest. The epiphytes obtain nutrients from the trees but do not harm them. The epiphytes can obtain enough light and water because they are perched on the tree branches.
- 

①

- b. Lichens look like a type of organism. But lichens are actually made up of algae and fungi living together. The algae provide food for the fungi. The fungi provide protection for the algae. This protection keeps the algae from drying out.
- 

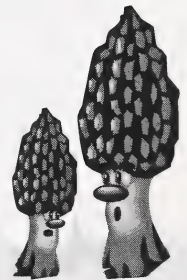
7. Use the following list of terms or expressions to answer a. to f. in this question.

broad	kingdom	share many traits
commensalism	low	specialist
community	narrow	speciation
generalist	parasitism	species
high	share few traits	speculation



Fill in the blanks by making selections from the list.

- ② a. The desert spadefoot frog (on page 23 of the textbook) is a \_\_\_\_\_ because it occupies a \_\_\_\_\_ niche.
- ① b. The small remora fish live on and around sharks. They eat stray bits of food left by the shark. The shark is not affected much by the presence of these fish. The relationship between the remora and the shark is an example of \_\_\_\_\_.
- ① c. Deer, aspen trees, grasses, mice, and coyotes are interdependent groups of organisms that form a(n) \_\_\_\_\_.
- ① d. Competition for the same resources likely caused much of the \_\_\_\_\_ leading to wolves, coyotes, and foxes.
- ① e. Suppose a healthy ecosystem in a particularly harsh environment consists of only 17 different plants and animals. This ecosystem has a \_\_\_\_\_ biological diversity compared to a tropical rain forest.
- ① f. Look at the two organisms. Assume they have the same structures and reproduce in nature. These two fanciful organisms are likely the same \_\_\_\_\_.



Return to page 25 of the Student Module Booklet and continue with Section 2.

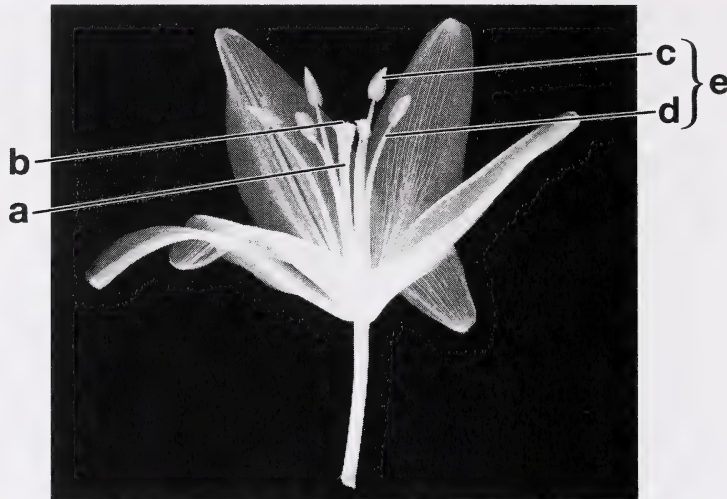
43

**Section 2 Assignment: Handing Down Species' Characteristics**

Read all parts of your assignment carefully and record your answers in the appropriate places.

5

1. Parts of a lily flower are pointed out in the following photograph.



Fill in the answer blanks to identify the parts that are designated.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

2

2. A zoospore is an asexual spore of some algae and fungi. Name one advantage and one disadvantage of producing zygosporangia instead of zoospores.

---

---

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3. A zoospore is a special type of spore.

①

a. What type(s) of reproduction produces zoospores?

---

①

b. How much genetic material must a spore carry to produce a new organism?

---

---

 Return to page 34 of the Student Module Booklet and continue with Lesson 2.

Circle the letter of the best response for questions 4 to 6.

①

4. DNA can be changed or damaged by X rays, ultraviolet light, cosmic rays, or chemicals. Changes can also occur due to random errors as DNA is passed down from one generation to the next.

What are such changes to DNA called?

- A. mutagens
- B. mutations
- C. mutuals
- D. clones

①

5. Which of the following traits do people get through both nature and nurture?

- A. a body mass of 85 kg
- B. blood group AB
- C. blue-grey eye colour
- D. an unattached earlobe

①

6. Some traits occur in one of two distinct forms. This includes “can roll tongue” and “cannot roll tongue.” Another example is “attached earlobe” and “detached earlobe.”

Which type of graph best shows the frequencies of several such traits in a group of people?

- A. a scatter plot
- B. a pie graph
- C. a line graph
- D. a bar graph

7. Classify the variation shown in the following photographs as either a continuous variation or a discrete variation. Explain your classification.

①

- a. Check the length of grass in the photographs on page 61 of the textbook.

---

---

①

- b. Note the preferred thumb placement in the photo on page 39 of the textbook.

---

---

Return to page 39 of the Student Module Booklet and continue with Lesson 3.

②

8. Fill in the blanks to describe cell production in the body of an organism.

Somatic cell production in plants and animals is the same process as

\_\_\_\_\_ in single-celled organisms. Both are examples of  
\_\_\_\_\_ reproduction.

9. Suppose an animal's somatic cell has 10 pairs of chromosomes.

①

- a. When a somatic cell divides, how many cells are formed?

---

①

- b. How many chromosomes are in each daughter cell when a somatic cell divides?

---

①

- c. When a somatic cell divides, how does the genetic makeup of a daughter cell compare to a parent cell?

---

①

- d. Name the process where genetic material is duplicated and divided during the division of somatic cells.

---



- ① e. How many chromosomes are in each gamete of this animal?
- \_\_\_\_\_
- ① f. Name the process by which genetic material is duplicated and divided in gamete production.
- \_\_\_\_\_
- ① g. How does the zygote's genetic makeup compare to the genetic makeup of the parents?
- \_\_\_\_\_
- \_\_\_\_\_
- ① h. Could the zygote ever obtain a heritable trait that it did not get from its parents? Explain.
- \_\_\_\_\_
- \_\_\_\_\_
- ② 10. Sexual reproduction requires an egg to be fertilized.
- What purposes does fertilization serve?
- \_\_\_\_\_
- \_\_\_\_\_
- ② 11. A person was heard to say, "John works out daily and has developed large muscles. As a result, his children will be born with large muscles."
- Do you agree or disagree with this person's statement? Explain your answer.
- \_\_\_\_\_
- \_\_\_\_\_
12. Identify the following biotechnologies by writing down the correct word or words after each statement.
- ① a. DNA patterns are used to trace the history of a domestic flower to its wild ancestors.
- \_\_\_\_\_

① b. The cells from an endangered male deer are used to produce offspring identical to its father. \_\_\_\_\_

① c. Genes from a bacterium are transferred into the cells of a plant. The plant and its offspring have an increased resistance to drought. \_\_\_\_\_

13. The structure of genetic material shows how traits are passed on at the cellular level from one generation to the next.

Use the following list of terms or expressions to answer a. to e. in this question.

A	chromosomes	phosphates
C	copy	salts
G	different from	structure and growth
T	DNA	sugars
behaviour and growth	genes	sulfates
behaviour and structure	identical to	twisted
BNA	mixture	

Fill in the blanks by making selections from the list.

① a. Strands of genetic material inside a cell's nucleus are called \_\_\_\_\_.

① b. These strands of genetic material are made up of units of inheritance called \_\_\_\_\_.

⑥ c. Genetic material is made of a molecule of \_\_\_\_\_. This molecule is shaped like a \_\_\_\_\_ ladder. The sides of the ladder are created from alternating subunits of \_\_\_\_\_ and \_\_\_\_\_. The nitrogen bases form the rungs of the ladder. The nitrogen bases always appear as pairs of *C* and \_\_\_\_\_ or *A* and \_\_\_\_\_.



- ① d. Genetic material controls the \_\_\_\_\_ of cells.
- ② e. In asexual reproduction the genetic material is \_\_\_\_\_ that  
of the parent(s). In sexual reproduction, it is a \_\_\_\_\_ of the  
parent(s) genetic material.
- ① 14. For a single-celled organism, what form of reproduction would lead to offspring that were  
genetically distinct?

**Submit your completed Assignment Booklet 1A to your teacher for assessment.**  
Then return to page 46 of the Student Module Booklet and begin Section 3.

## ASSIGNMENT BOOKLET DECLARATIONS

The school you are registered with may require you to submit this signed form with your Assignment Booklet.

The Student's Declaration is to be signed by the student. If the student is under 16, the Supervisor's Declaration may need to be signed by the supervisor, who is usually a home instructor, teacher, or home-schooling coordinator. Failure to complete this page may invalidate the assignment results. Please contact your school and ask if this completed form is required.

### STUDENT'S DECLARATION

- I have followed the instructions outlined in the Student Module Booklet.
- I have completed the activities to prepare myself for the assignments in this Assignment Booklet.
- I completed the assignments in this Assignment Booklet by myself.

\_\_\_\_\_  
Student's Signature

### SUPERVISOR'S DECLARATION

I hereby certify that I have supervised the learning activities completed by \_\_\_\_\_.  
Student's Name

I also certify that to the best of my knowledge the assignments in this Assignment Booklet were completed independently by this student.

\_\_\_\_\_  
Supervisor's Signature

If you, the student or supervisor, have any comments or observations regarding this module, write them in the following space.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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